

08/913184
74 Rec'd PCT/PTO 08 SEP 1997**COMMUNICATIONS AND MEASUREMENT APPARATUS**

The invention concerns a communications and measurement apparatus with a cuboid housing having a display unit on its front face and a plurality of openings arranged side-by-side for receiving plug-in modules on its back face, at least one of which modules is a data processing module, and equipped with additional modules for forming external interfaces for measurement and data transmission lines.

In a known apparatus of this type (Brochure DA-058-01-A4 - "interWATCH 95000" of GN Navtel, dated September 1994) three openings are provided on the rear face of the apparatus; one opening is intended for receiving a data processing module, while another opening is intended for a module for establishing connection with a Local Area Network. A third opening on the rear face of the known apparatus is provided to receive parallel or serial devices and/or the connection for a VGA monitor. The known apparatus has additional modules on the top of the housing where eight openings are provided for receiving eight modules. These modules are designed for forming external interfaces for measurement and data transmission lines.

The object of this invention is to provide an easy-to-handle communication apparatus having a compact design.

To achieve this object, in a communication and measurement apparatus of the aforementioned type all the additional modules are arranged in the same number of openings on the rear face of the apparatus next to the data processing

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module on one side of this module; an extra module with a system control is arranged between the additional modules and the data processing module so that its component-carrying side faces said data processing module, and all the additional modules and the extra module have a common backplane.

One essential advantage of the apparatus according to this invention is the fact that by arranging all the modules on the rear face, the apparatus can be mounted in racks, in which case the apparatus can be accessed from the front and the rear, although it is not accessible from above; the apparatus according to this invention takes this fact into account by having its top closed and having all the additional modules on its rear face. The apparatus according to the invention can therefore be stacked with other apparatuses. Another important advantage consists of the fact that the apparatus has a compact design due to the side-by-side arrangement of the modules, which allows good ventilation because in the apparatus according to the invention an internal (relatively large-surface) backplane of the additional modules and of the extra module runs vertically in the apparatus, thus not hindering air convection. The special arrangement of the extra module also contributes to the compact design, since it obviates the necessity of running the electrical conductor leading to the data processing module around the extra module or the backplane.

In the apparatus according to the invention, the extra module is advantageously connected to the backplane of the data processing module through a plug-and-socket connection arranged on its component-carrying side and a short conductor segment. Thus a particularly simple electric connection can be established between the extra module and the backplane of the data processing module.

A fan device is advantageously arranged under the modules of the apparatus according to the invention. Thus the natural convection is reinforced by forced ventilation, which is particularly effective in the apparatus according to the invention because the relatively large backplane of the additional modules and of the extra module does not impair the air circulation.

To explain the invention,

Figure 1 shows a perspective view of one embodiment of the apparatus according to the invention observed obliquely from the front;

Figure 2 shows a perspective view of the same embodiment observed

obliquely from behind;

Figure 3 shows a view identical to that of Figure 2, but omitting some of the additional modules; and

Figure 4 shows a perspective view of the same embodiment with the housing removed.

As Figure 1 shows, apparatus 1 according to the invention has a cuboid housing 2, having a display unit 4 with an LCD display 5 on its front face 3. Display unit 4 hinges on its upper edge 6 and, when opened on this hinge, exposes a cover plate 3A on the front face. In addition, an opening 7 for receiving a diskette is provided on front face 3. Each side of housing 2 is provided with a carrying handle; Figure 1 shows one of these, namely carrying handle 8.

Figures 2 and 3 show that a plurality of plug-in modules 11 are provided on the back-plate 10 in the top right area; said modules are introduced in the openings provided in the rear wall that are not shown in Figures 2 or 3; these plug-in modules 11 form a data processing module 11A and can be formed using commercially available PC modules. Another opening is provided in back-plate 10 below plug-in modules 11, where a mass storage device 12 is mounted.

Figures 2 and 3 further show that additional openings 13 are provided on back-plate 10 of apparatus 1, where additional modules 14 through 19 can be mounted. The additional modules 14 through 19 are modules forming external interfaces for measurement and data transmission lines. Figure 3 only shows one additional module 14, in order to make internal backplane 20 visible.

Backplane 20 has plugs (not illustrated) on its side facing the front, which are freely accessible when cover plate 3A is removed. These plugs allow additional functions to be implemented using additional plugged-on boards.

Figures 2 and 3 also show that an extra module 21 is mounted in the opening to the extreme right in the figures among the additional openings 13; this module is a system control module. This extra module 21 is advantageously provided with a system control processor. The extra module 21 is arranged close to data processing modules 11A to achieve electric connection between extra module 21 and data processing module 11A without complicating the design or requiring additional space. Figure 4 shows further details.

Figure 4 shows extra module 21 again, which in the embodiment illustrated is provided with a circuit board 22. Components, not illustrated in Figure 4 for the sake of clarity, are located on the side facing the observer of said circuit board 22. A plug device 23 is also located here, from which a flexible conductor 24 runs as a short conductor segment on a backplane 25 running horizontally under the additional data processing module 11A. Thus an electric connection is established between extra module 21 and data processing module 11A without requiring a conductor to run over, under, or behind the extra module. The arrangement of the extra module 21 contributes substantially to the compact design of the apparatus according to the invention.

It should also be pointed out that, in the embodiment illustrated, two fans 26 and 27 are located under the modules, from which air moves after filtering between modules 14 through 19 and 21 providing a good cooling effect.